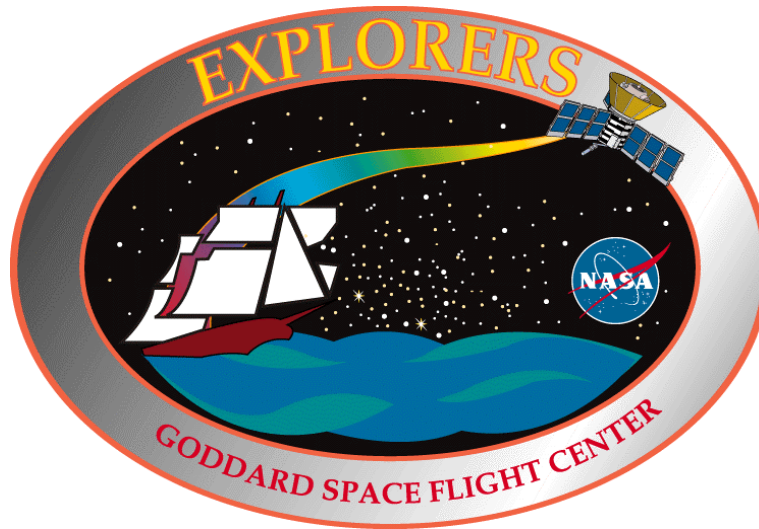


Explorer Options for the Future



***Presentation to the SEUS and OS
July 2, 2003***

***Paul Hertz
Explorer Program Scientist***



Explorers Program Mission

Explorers are space physics and astronomy missions intended to study the Sun, to examine the space environment of the Earth and other planets, and to observe the universe beyond our Solar System.

The mission of the Explorers Program includes:

- Conduct world-class scientific investigations of modest programmatic scope.
- Provide continuing flight opportunities.
- Utilize innovative, streamlined, and efficient management approaches; contain costs and improve performance; enhance public awareness of space science; incorporate educational and public outreach activities as integral parts of space science investigations.



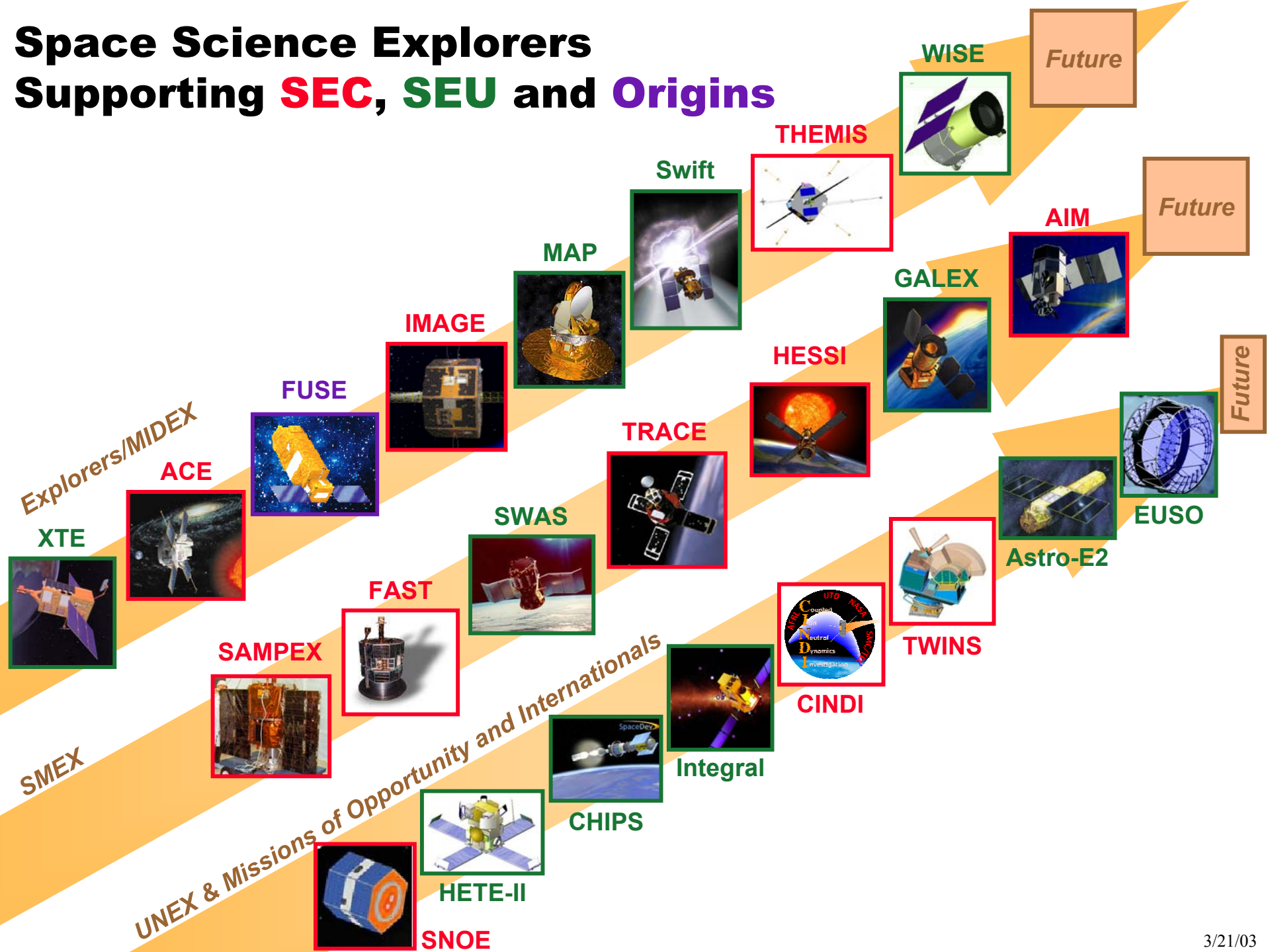
Explorers Classes of Projects

The Explorer Program provides several classes of projects:

- Medium-class Explorers (MIDEX) – are investigations characterized by definition, development, launch service, and mission operations and data analysis costs not to exceed \$180 million (FY02 \$) / \$220-240 million (FY05 \$) total cost to NASA.
- Small Explorers (SMEX) – are investigations characterized by definition, development, launch service, and mission operations and data analysis not to exceed \$120 million (FY03 \$) total cost to NASA.
- University-class Explorers (UNEX) – are investigations characterized by definition, development, launch service, and mission operations and data analysis costs not to exceed \$15 million (RY \$) total cost to NASA. There are no current plans for future UNEX AO's.
- Missions of Opportunity (MO) – are investigations characterized by being part of a non-NASA space mission of any size and having a total cost to NASA under \$35 million. They are conducted on a no-exchange-of-funds basis with the organization sponsoring the mission. Small investigations (long duration balloons, International Space Station, data buys) may also be selected as Missions of Opportunity. NASA solicits proposals for Missions of Opportunity with each Announcement of Opportunity (AO) issued for UNEX, SMEX, and MIDEX investigations.

Space Science Explorers

Supporting **SEC**, **SEU** and **Origins**





History of Explorer AO Cost Caps

- SMEX 1/2/3 (1988) – lost in ancient history
- SMEX 4/5 (1993) - \$50M (FY93) covered science payload only plus GSFC provided spacecraft, mission integration & test; launch vehicle and mission operations from separate budget
- MDEX 1/2 (1995) - \$70M (FY94) similar to SMEX 4/5
- SMEX 6/7 (Apr 97) - \$69M (FY97) covered life cycle costs
- UNEX 1/2 (Jan 98) - \$13M (FY98) covered life cycle costs
- MDEX 3/4 (Mar 98) - \$140M (FY98) covered life cycle costs
- SMEX 8/9 (Nov 99) - \$75M (FY00) covered life cycle costs
- MDEX 5/6 (Jul 01) - \$180M (FY02) covered life cycle costs including 20% reserves and NIAT requirements
- SMEX 10/11 (Feb 03) - \$120M (FY03) covered life cycle costs including 20% reserves and NIAT requirements
- MDEX 7/8 (May 04) - \$220-240M (FY05) will cover life cycle costs including 25% reserves and evolving NIAT requirements



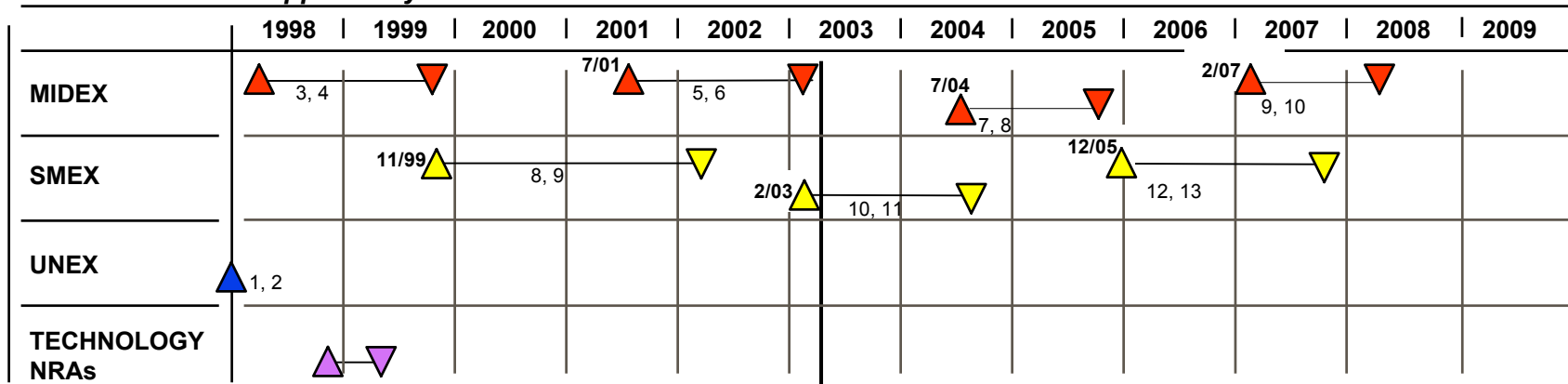
Explorers in Development

Swift	MIDEX-3	December 2003	\$140M (FY98)
CINDI	MO (USAF)	January 2004	(SMEX 8/9)
TWINS	MO (US)	Mar 04, Jun 05	(SMEX 6/7)
Astro-E2	MO (Japan)	February 2005	(SMEX 8/9)
THEMIS	MIDEX-5	August 2006	\$180M (FY02)
AIM	SMEX-9	September 2006	\$80M (FY00)
WISE	MIDEX-6	December 2007	\$180M (FY02)
EUSO	MO (ESA)	December 2008	(MIDEX 5/6)

Explorers Schedule

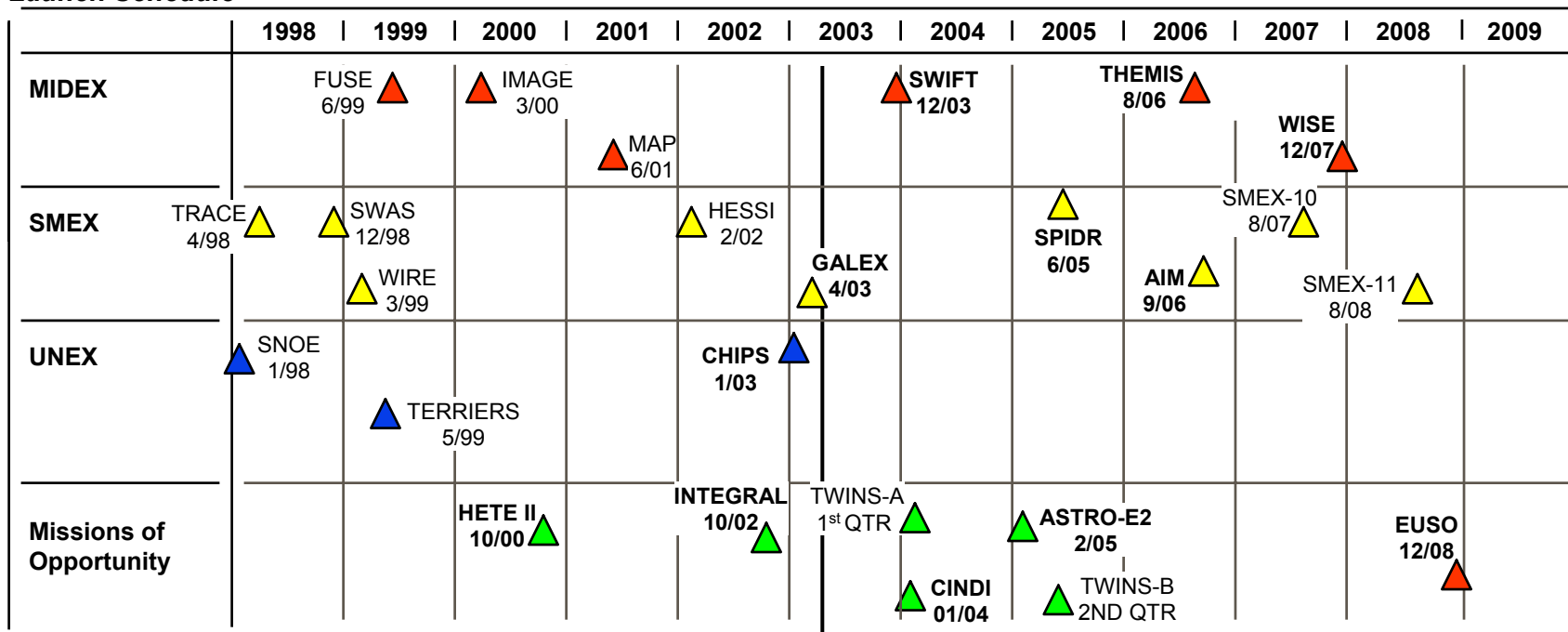
Announcements of Opportunity

4/30/03



△ = Issued ▽ = Selected

Launch Schedule





Planning Budget Supports

	AO Release	Launch	Cost Cap
SMEX 10/11	Feb 03	Aug 07, 08	\$120M (FY03)
MIDEX 7/8	May 04	Dec 09, 10	\$240M (FY05) **
SMEX 12/13	Dec 05	Jun 10, 11	\$120M
MIDEX 9/10	Feb 07	Sep 12, 13	\$240M

- MO's delay future AO's
- Higher cost caps delay future AO's
- Budget adjustments delay future AO's
- Terminations may accelerate future AO's

** The cost cap has not been set for this AO



Setting the Cost Cap

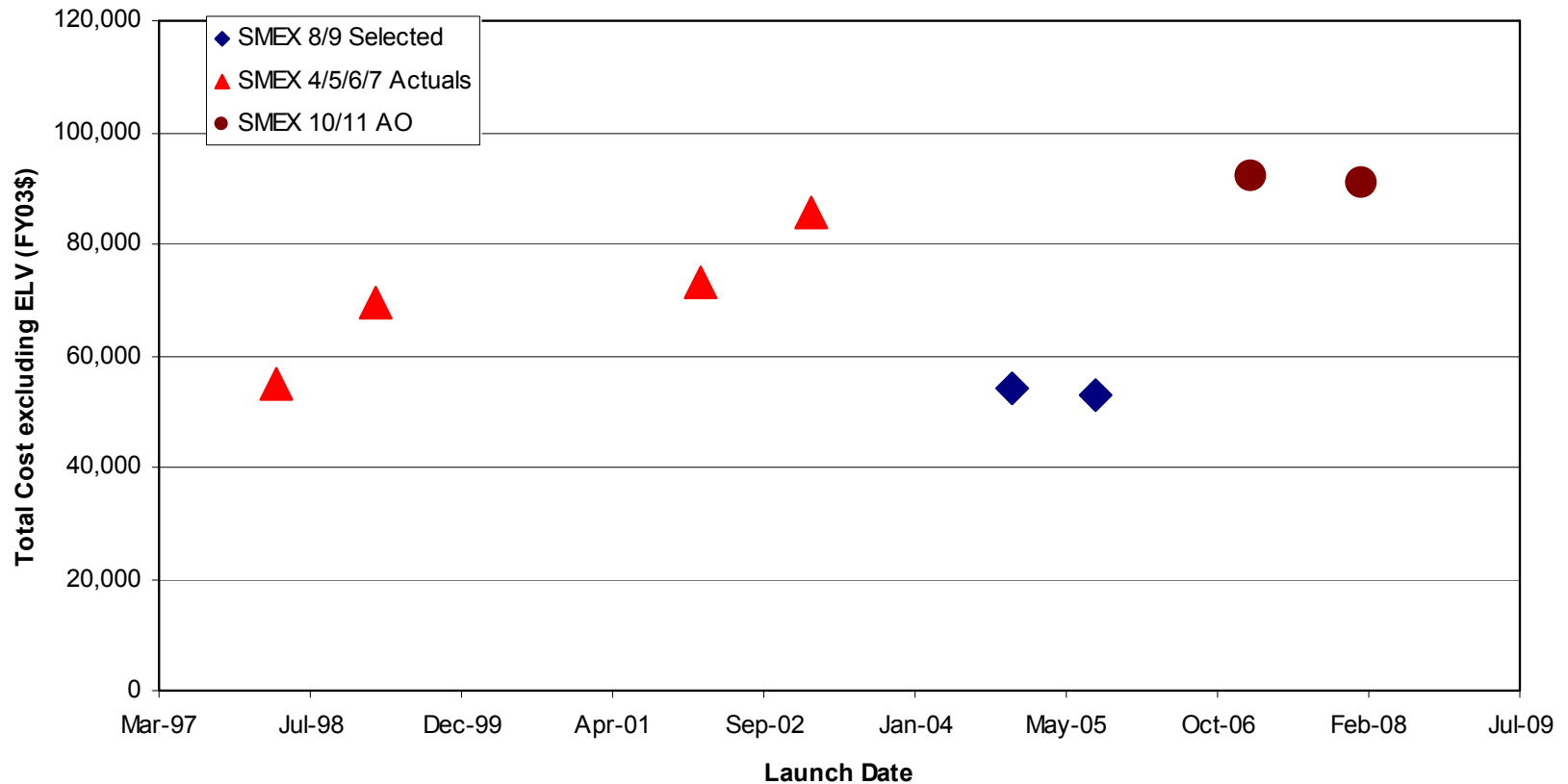
Cost cap set by

- Inflating previous AO
- Adjusting for launch vehicle costs
- Adjusting for new requirements
- Making programmatic changes

Examples	SMEX 2003	MIDEX 2004
Inflate previous	\$ 81M	\$ 197M
Adjust for LV cost increase	\$ 5M	\$ 7M
Increase reserves	\$ 2M	\$ 9M
Programmatic change	\$ 5M	\$ 4M
First estimate	\$ 97M	\$ 217M
Actual cost cap	\$120M	\$ 220-240M



Setting the SMEX Cost Cap





Programmatic Adjustments for SMEX

Downselect evaluation for SMEX 1999 indicated that, on average, cost risk was significantly higher than previous Explorer or Discovery downselects.

- TMC-lite was used
- Cost cap was low according to formula
- Has all the “low hanging fruit” been harvested for SMEX?

Programmatic adjustment was applied to SMEX 2003 AO

- Cost cap raised from \$75M (FY00) to \$120M (FY03)
- Goal: To solicit the best science mission that would fit on a Pegasus. The intent is that the limit is technical (mass, volume, schedule) rather than cost.

Experiment is still in progress. Preliminary results in October.



Explorer Planning Programs

The Explorer Planning Budget will support the missions currently under development plus

- 2 MIDEX & 2 SMEX every 3 years (planning program)
- 1 MIDEX & 1 BIGEX every 3 years
- 1 SMEX, 1 MIDEX, & 1 BIGEX every 3.5 yrs

An MO delays the program by 3 months.

Assumption: SMEX \$120M

MIDEX \$240M

BIGEX \$420M

No increase in launch vehicle costs above inflation